



**BUSITEMA
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Pursuing Excellence

**FACULTY OF ENGINEERING
DEPARTMENT OF WATER RESOURCES AND MINING
FINAL YEAR PROJECT REPORT**

**TITLE: DESIGN AND SIMULATION OF AN AUTOMATIC DEWATERING
SYSTEM FOR TIIRA MINE**

BY

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BU/UG/2013/52

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A final year project report presented in Partial Fulfillment of the Requirements for the Award of
the Bachelor of Science in Mining Engineering.

ABSTRACT

Underground mining is the method where by the mineral is removed through shafts or tunnels and ore can be recovered through sublevels. Tiira Gold Mine is also among the small scale mines in Uganda located in Busia district in Eastern Uganda at approximately 200 km east of the Kampala (Hester et al. 2009). It is currently operated by Green Stone Resources Ltd (GRL).

The mine extends to 55 meters deep and this has exposed the mine to ground water ingress into the mine. This has caused problems like lowered rate of production and failure to reach targeted production and complicity in ore handling from the mine among others. In addition,

With appropriate regard to both theory and practice, effective dewatering can be accomplished under almost any field conditions (Wolkersdorfer, 2008). Pumping may be required to maintain water levels at a specific elevation to control the discharge and for treatment if needed (Johnson and Younger, 2000, Demchak et al.2004). It should be promoted and those challenges minimized.

To develop an efficient dewatering system, a set of procedures should be followed. Sources of water have to be identified through analysis of borehole and hydrological data and it was found that ground water is the major source of water into the mine due to the fractured aquifers and the rock fissures cracks and faults.

The pumping network design depends on the rate of flow and the total dynamic head which is the sum of the static head, frictional losses and minor losses. Knowing the total dynamic head, the capacity of the pump can be determined using the pump characteristic curve. The rate of flow was found to be 991.97 Gpm and a head of 240.43 ft.

The automatic system is based on the sump capacity which is the distance between water level and the top part of the sump and will be accomplished by Arduino and Proteaus software. The biggest benefit of automation is that it saves labor, it is also used to save energy and materials and to improve quality, accuracy and precision.

DECLARATION

I Asiimwe Dan, hereby declare to the best of my knowledge, that this project report is an outcome of my original work and that it has not been presented to any institution of learning for an academic award.

ASIIMWE DAN

Signature.....



APPROVAL

This final year project report has been submitted to the Department of Water Resources and Mining, Faculty of Engineering for examination with approval of my supervisors

MR. NASASIRA HILARY

Signature.....

MR. TUGUME WYCLIFFE

Signature.....

DEDICATION

This report is dedicated to my dear parent Mr. Bigirimana Eric and Mrs. Mukiza Oliva, my sister Ninsiima Mercy and my brothers Reuben and Simon.

ACKNOWLEDGMENT

Am so grateful for the Lord for his favor and love upon me and how far He has taken me as far as my life is concerned. I also thank my supervisors Mr. Nasasira Hilary and Mr. Tugame Wycliffe for their tireless help as far as this project is concerned. I also thank my fellow students for their advice in relation to the accomplishment of this final year project report. Lastly I thank my dear parents for their support upon my academics.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Underground mining is the method where by the mineral is removed through shafts or tunnels and ore can be recovered through sublevels. Underground mining is used for deposits which are at greater depth where it is uneconomical to strip the overburden to recover such an ore. During underground mining many problems are encountered like subsidence which is the collapse of the roofs and this affects the surface structures, ventilation problems especially in coal mines e.g. methane gas emission, water problems among others.

Tira Gold Mine is an underground and surface mine located in Busia district in Eastern Uganda at approximately 200 km east of the Kampala (Hester et al. 2009). It is currently operated by Green Stone Resources Ltd (GRL).

Ore is extracted through sub levels that are connected to the main shaft which extends to 55 meters deep and this has exposed it to ground water ingress into the mine. This has caused problems like lowered rate of production and failure to reach targeted production and complicity in ore handling from the mine among others. In addition, Mine development often causes penetration of water table and results in groundwater flow into the mine.

With appropriate regard to both theory and practice, effective dewatering can be accomplished under almost any field conditions (Wolkersdorfer, 2008). Pumping may be required to maintain water levels at a specific elevation to control the discharge and for treatment if needed (Johnson and Younger 2000; Demchak et al. 2004). Therefore, it should be promoted so that these challenges are minimized.

Therefore, relatively dry working environments are preferred, as they maintain efficient mining conditions; improve slope and wall stability and therefore safety (Van Mekerck, 1993) as mining industry plays a crucial role in socio-economic development (Mpofu *et al.* 2014).

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